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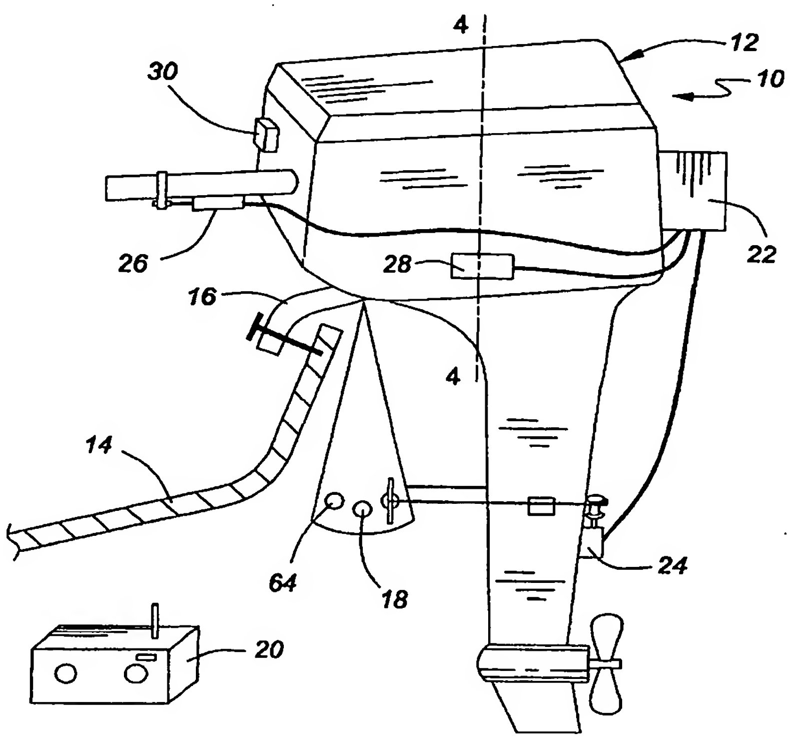


(57) Abrégé/Abstract:
There is provided a remote control apparatus for the control of an outboard motor on a vessel. The remote control apparatus comprises: a command transmitter, at least one command receiver in wireless communication with the command transmitter, a steering controller in operativ communication with the command receiver, a throttle controller in operative communication with the command receiver, a gearing controller in operative communication with the command receiver, and a shut-off controller in operative communication with the command receiver. In operation a user can send a signal from the command transmitter which signal is received by the command receiver and conveyed to a corresponding controller, for action to carry out the command.

## ABSTRACT OF THE DISCLOSURE

There is provided a remote control apparatus for the control of an outboard motor on a vessel. The remote control apparatus comprises: a command transmitter, at least one command receiver in wireless communication with the command transmitter, a steering controller in operative communication with the command receiver, a throttle controller in operative communication with the command receiver, a gearing controller in operative communication with the command receiver, and a shut-off controller in operative communication with the command receiver. In operation a user can send a signal from the command transmitter which signal is received by the command receiver and conveyed to a corresponding controller, for action to carry out the command.

## TITLE OF THE INVENTION

REMOTE CONTROL SYSTEM FOR AN OUTBOARD MOTOR

## FIELD OF THE INVENTION

The invention relates to a remote control system for an outboard motor, more particularly, an apparatus for the control of an outboard motor on a vessel.

## BACKGROUND OF THE INVENTION

It is frequently desirable to control an outboard motor without the need for the pilot to physically contact the motor. For example, when an outboard motor is used on a boat, the pilot may wish to be in the bow of the boat, while the motor is secured to the stern.

The most common approach to remote control of outboard motors has been to run cables from the motor to the bow of the boat, or another location where the pilot wishes to remain. The use of cables presents several disadvantages. First, the adequate securing of cables frequently requires that holes be drilled in the hull of the boat, to permit the passage of cable, as well as the securing of appropriate anchors for the cable. This can be undesirable both aesthetically and in terms of structural strength and water resistance. Moreover, the pilot is limited in his or her location when piloting the boat, to the location from which the cables are accessible. Additionally, cable systems generally require anchoring of the cable system on the boat as well as to the motor. This may impede the removal of the motor from the boat. Moreover, it may not be possible to conveniently use the cable-system to remotely control the motor on a second boat.

United States Patent No. 3,651,779 of Norton ("Norton") discloses a control system for electronically controlling a boat powered by a twin screw inboard/outboard drive system. This system requires that a control box be

connected to a plurality of reversible direct current ("DC") motors by means of continuous wire connections. Thus, Norton fails to fully overcome the disadvantages of conventional cable-based remote control systems, in that wires must still be run from the motor to the control box. This may require that anchors and holes be inserted in the hull of the boat, and also limits the potential pilot location within the boat, and may impede the removal of the motor from the boat.

United States Patent No. 5,050,519 of Senften ("Senften") discloses a motor control system for a boat in which the propulsion motor is automatically responsive to a control system for moving the boat. The motor control system may be responsive to one of several different types of control input, including radio frequency signals. The motor control of Senften is adapted to control a small electric motor. This system is inappropriate for use with an internal combustion motor for several reasons. First, Senften fails to disclose a throttle mechanism suitable for use with conventional throttles on internal combustion outboard motors. Moreover, the steering mechanism disclosed by Senften fails to change the direction of thrust of the main propellor on the outboard motor. Rather, it relies on a secondary propellor, positioned at right angles to the primary thrust propellor, to provide a transverse thrust when turning is required. Such an approach may add considerable weight and expense to the outboard motor system. Moreover, where a powerful internal combustion engine is used to drive the main thrust propellor, it may be difficult to steer effectively using only a small electric propellor.

United States Patent Application No. 4,614,900 of Young ("Young") discloses a means for the remote control of an electric trolling motor by a hand held or foot operated radiant energy transmitter co-acting with a receiver. Young discloses a steering means, wherein a specialized gear is mounted on the shaft connected to the propellor portion of the electric motor, and this specialized gear interacts with a gear on a steering motor, to change the direction of thrust by the propellor. The requirement for a specialized gear located on the shaft of the motor may make the system of Young inappropriate for use with many existing outboard

motors, and particularly for those owners who rely on warranty protection in respect of their outboard motor. Moreover, the system of Young may not be appropriate for use with internal combustion engines, where the driveshaft specifications may be different than they are for electric motors.

United States Patent No. 4,715,836 of Schulte ("Schulte") discloses a remote steering assembly kit for outboard trolling motors having an elongated cylindrical driveshaft housing with a trolling motor at the top of the housing. The steering system of Schulte relies on a special large diameter gear which is operatively connected to the driveshaft of the propellor, permitting rotation of the thrust direction of the propellor by rotation of the large diameter gear. The large diameter gear is driven by a smaller gear controlled by a small DC electric motor mounted at the rear of the base plate of the mounting bracket for the outboard motor. Thus, the steering assembly of Schulte suffers from substantially the same weakness as the steering mechanism of Young, namely that it requires the use of a specialized gear which may be inappropriate for use on many existing outboard motors, and also may be inappropriate for use on internal combustion outboard motors.

United States Patent No. 4,810,216 of Kawamura ("Kawamura") discloses a remote control device for an outboard motor including a remotely positioned controller device which operates control devices connected to the outboard motor through optical fiber transmitted signals. The remote control device of Kawamura is dependent upon a continuous physical link between the control device and the controlled motor, in this case in the form of optical fibers. Thus, the remote control system of Kawamura does not fully overcome weaknesses of the traditional cable-based approach to remote control systems, as previously discussed.

It is therefore an object of the invention to provide a remote control system for an outboard motor which is suitable for use with existing, internal combustion outboard motors.

## SUMMARY OF THE INVENTION

In a first aspect of the invention, there is provided a remote control apparatus for the control of an outboard motor on a vessel. The remote control apparatus comprises: a command transmitter, at least one command receiver in wireless communication with the command transmitter, a steering controller in operative communication with the command receiver, a throttle controller in operative communication with the command receiver, a gearing controller in operative communication with the command receiver, and a shut-off controller in operative communication with the command receiver. In operation a user can send a signal from the command transmitter which signal is received by the command receiver and conveyed to a corresponding controller, for action to carry out the command.

In another aspect of the invention there is provided a remote throttle controller for an internal combustion motor on a vessel, the motor having a throttle actuator rotatable about a longitudinal axis. The throttle controller comprises: means to receive operative communication from a remote transmitter for mover operation, means to receive power for mover operation, a bi-directional throttle actuator mover, and an operative linkage between the mover and the throttle actuator. In operation, a movement of the throttle actuator mover causes the linkage to move, causing a corresponding rotation of the throttle actuator.

In another aspect of the invention there is provided a first gearing controller adapted for use on an outboard motor wherein gearing control is actuated by rotation of the throttle handle. The first gearing controller comprises: a bi-directional actuator mover, an operative linkage between the mover and the throttle actuator, means to receive operative communication from a remote transmitter for mover operation, and means to receive power for mover operation. In operation, a movement of the throttle actuator mover causes the linkage to move, causing a corresponding rotation of the throttle actuator and the corresponding movement of the gears.

In another aspect of the invention there is provided a steering controller adapted for use on an outboard motor on a vessel, wherein the motor is pivotable on a transom mounting bracket. The steering controller comprises: a bi-directional steering mover, an operative linkage between the mover and the bracket, means to receive operative communication from a remote transmitter for mover operation, and means to receive power for mover operation. In operation, movement of the steering mover causes the operative linkage to move, placing a pulling force on the motor and the bracket, thereby causing rotation of the motor with respect to the bracket.

In another aspect of the invention there is provided a rotational gearing controller adapted for use on an outboard motor having a gearshaft adapted to actuate gear changes by rotation along a longitudinal axis. The gearing controller comprises: a shaft engager adapted to releasably engage the gearshaft, a bi-directional gearing mover, an operative linkage between the mover and the shaft engager, means to receive operative communication from a remote transmitter for mover operation, and means to receive power for mover operation. In operation, activation of the mover causes rotation of the shaft engager which rotates the gearshaft.

In another aspect of the invention there is provided a remotely controllable shut-off controller for an internal combustion motor, the motor having a releasable clip mediated shut-off mechanism in which disengagement of the clip from a switch during motor operation causes motor shut-off. The shut-off controller comprises: a shut-off mover, an operative linkage between the shut-off mover and the clip, means to receive operative communication from a remote transmitter for mover operation, and means to receive power for mover operation. During normal motor operation, the shut-off mover is in a first position permitting the clip to engage the switch, and activation of the shut-off mover causes the mover to move to a second position, causing the clip to disengage from the switch.

In another aspect of the invention there is provided a command

transmitter adapted for use with a remote control apparatus including a command receiver for the control of an outboard motor on a vessel. The command transmitter comprises: a water sensor and signaling means. In operation, contact between the water sensor and water causes an operative signal to be transmitted by the signaling means to the command receiver.

## BRIEF DESCRIPTION OF THE DRAWINGS

Without limiting the scope of the invention, preferred embodiments of the invention are illustrated in the drawings in which:

FIGURE 1 is a perspective view of an embodiment of the remote control apparatus of the present invention assembled on an outboard motor which is secured to a vessel.

FIGURE 2 is a side view of an embodiment of the remote throttle controller of the present invention shown in association with a throttle actuator and a tiller arm of an engine.

FIGURE 3 is a side view of an embodiment of the steering controller of the present invention, shown assembled on a portion of an outboard motor.

FIGURE 4 is a cross-sectional view of an embodiment of a portion of the rotational gearing controller of the present invention, shown in association with a portion of an outboard motor, through line 4-4 of FIGURE 1.

FIGURE 5 is a side view of a portion of an embodiment of the rotational gearing controller of the present invention, shown assembled on a portion of an outboard motor.

FIGURE 6 is a perspective view of an embodiment of the shut-off controller of the present invention in an "on" position, shown in association with a portion of an internal combustion engine.

FIGURE 7 is a perspective view of an embodiment of the shut-off controller of the present invention in an "off" position, shown in association with a portion of an internal combustion engine.

FIGURE 8 is a schematic wiring diagram of an embodiment of the command receiver of the present invention.

FIGURE 9 is a elevational view of the exterior of an embodiment of a command transmitter for use with the command receiver depicted in Figure 8.

FIGURE 10 is a schematic diagram of an embodiment of a portion of a switch for use with the control receiver shown in Figure 8.

While the invention will now be described in conjunction with the illustrated embodiment, it will be understood that it is not intended to limit the invention to such embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

## DETAILED DESCRIPTION OF THE INVENTION

In Figure 1, there is depicted an embodiment of the remote control apparatus 10 of the present invention, shown removably assembled on an outboard motor 12, which is secured to a stern portion of a vessel 14. The motor 12 is secured to the vessel 14 by a fixed bracket 16 having a backing plate 18 with holes 64. A backing plate is a feature used to support the motor in various positions. The vessel 14 depicted is a boat, while that is the preferred vessel, it will be appreciated that the apparatus of the present invention may be used with any

suitable vessel employing an appropriate motor.

The apparatus 10 includes a command transmitter 20, a command receiver 22, a steering controller 24, a throttle controller 26, a gearing controller 28, and a shut-off controller 30.

Turning to Figure 2, there is depicted embodiment of the throttle controller 26 of the present invention secured to the tiller arm 32 of a motor 12, and operatively connected to the throttle actuator 34 of the motor 12. The throttle controller 26 has a bi-directional throttle actuator mover 34a. The throttle actuator mover 34a has a shaft 42, a throttle linkage engager 44 and a throttle linkage 36, said throttle linkage 36 having a first region 38 and a second region 40. The throttle actuator mover 34a may be any suitable driver and is preferably a bi-directional DC electric motor.

The throttle actuator 34 of the motor 12 is adapted to rotate about a longitudinal axis A, with rotation possible in the directions indicted by arrow R on Figure 2. Rotation of the throttle actuator 34 about axis A causes the throttle to open or close, depending upon the direction of rotation. In operation, throttle controller 26 controls the direction of rotation of the throttle actuator 34 through movement of the throttle linkage 36 by the throttle actuator mover 34a. In particular, the throttle actuator mover 34a is secured by straps 132 to the tiller arm 32, and has a shaft 42 extending towards the throttle actuator 34. At the end of the shaft 42 is the throttle linkage engager 44, which engages the second region 40 of the throttle linkage 36. Preferably, the throttle linkage 36 and the throttle linkage engager 44 have coggles, which operatively intermesh. The first region 38 of the throttle linkage 36 is operatively connected to the throttle actuator 34. Preferably, the throttle linkage 36 and the throttle actuator 34 have coggles, which operatively intermesh. Thus, rotation of the throttle actuator mover shaft 42 by the throttle actuator mover 34a causes rotational movement of the throttle linkage 36, rotating the throttle actuator 34 as indicted by arrow R. Throttle actuator mover 34a is adapted to cause rotational movement of shaft 42 in either direction, permitting

both opening and closing of the throttle through movement of the throttle actuator 34. Action of the throttle actuator 34 is governed by the command receiver 22 through commands communicated from the command receiver 22 to the throttle actuator mover 34a by way of a receiver line 46, operatively connecting the command receiver 22 and the throttle actuator mover 34a. The throttle actuator mover 34a may be mounted to the tiller arm 32 by an adjustable bracket. An adjustable bracket would facilitate adjustment of the distance between the throttle actuator 34 and the throttle actuator mover shaft 42, in order to maintain proper tension on throttle linkage 36. The throttle actuator 34 may be fitted with a locking slip ring having coggles that intermesh with throttle linkage 36, to further facilitate effective interaction of the throttle actuator 34 and the throttle linkage 36.

Turning to Figure 3, there is depicted an embodiment of the steering controller 24 of the present invention, shown in association with a portion of a motor 12, including a backing plate 18. The steering controller 24 has a steering actuator 48 and a steering linkage 50 having ends 52 and a loop 54. The steering actuator48 has a steering actuator shaft 56, a steering linkage engager 58 and steering linkage tensioners 60, (only one side shown).

In operation, the steering linkage ends 52 are secured to the backing plate 18. Preferably, two height pins 62 are used, one on each side of the backing plate 18. In this embodiment, the height pins 62 do not pass fully through the backing plate 18 and do not interfere with normal tilt adjustment of the motor 12. Normal tilt adjustment is therefore possible using the remaining holes in the backing plate 18, in the conventional manner. The steering linkage loop 54 frictionally engages the steering linkage engager 58 and the linkage is kept taut by the steering linkage tensioners 60 on either side of the motor 12. The steering mover 48 rotates the steering actuator shaft 56, causing the steering linkage engager 58 to apply a pulling force to one end of the steering linkage 50. As the steering linkage ends 52 are secured to the backing plate 18, which is fixed, the application of force on the steering linkage 50 causes a rotation of the motor 12 in a left or right direction, as indicated by arrow Q in Figure 3. Rotation of the

steering actuator shaft 56 in one direction will result in rotation of the motor 12 in the opposite direction. It will be appreciated that the linkage may, alternatively, be secured to another appropriate region of the transom mounting bracket, or to an appropriate region of the transom itself. Nonetheless, it is preferable to secure the linkage to the backing plate to facilitate the adjustment of the angle of the motor relative to the transom when the steering controller is in place.

Figures 4 and 5 depict an embodiment of the rotational gearing controller 28 of the present invention, assembled on a motor 12 having a gear shaft 66 adapted to rotate about a longitudinal axis Y and to be rotatable between a forward position F and reverse position G (shown in ghost). As seen in Figure 4, the rotational gearing controller 28 has a shaft engager 68, which is adapted to releasably engage the gear shaft 66, and to rotate upon the longitudinal axis Y. As seen in Figure 5, the rotational gearing controller 28 further includes a bi-directional gearing actuator 70 operatively connected to the shaft engager 68. In the embodiment depicted, the gearing actuator70 includes a worm shaft 72 and a portion of a worm gear 74.

In operation, the gearing actuator 70 causes rotation of the worm shaft 72, which engages the worm gear 74. The worm gear 74 is secured to the shaft engager 68. Thus, rotation of the worm gear 74 causes a corresponding rotation of the shaft engager 68. Due to the engagement of the shaft engager 68 with the gear shaft 66 this causes rotation of the gear shaft 66. Thus, it is possible to move the gear shaft 66 between its forward position F and its reverse position G. Generally, the neutral position is located between position F and position G. As shown in Figure 5, the gearing actuator 70 receives commands from the command receiver 22 by means of a receiver line 46. The gearing actuator is preferably a bi-directional DC motor. The rotational gearing controller 28 preferably further includes means, such as an audible light or alarm, to notify the user when the gear shaft is in forward neutral, or reverse gears.

In some motors, such as recent MERCURY (trade-mark) motors,

gearing control is actuated by rotation of the throttle handle. Referring to Figure 2, in some motors, rotation of the throttle actuator 34 in a first direction about axis A past a neutral position "A", results in movement of the gears to the forward position "F", where as rotation in a second direction about axis A past the neutral position results in movement of the gears to the reverse position "G".

Thus, in motors where gearing is actuated by rotation of the throttle handle, gearing and throttle may be controlled using a first gearing controller consisting substantially of the throttle control system of the present invention wherein the actuator 34 is rotatable in both the first and the second direction from the neutral position "N". Preferably, the first gearing controller further includes means to notify the user when the gear shaft is in forward, neutral, or reverse gear.

Figures 6 and 7 depict an embodiment of the shut-off controller 30 of the present invention, secured to a portion of a motor 12. Figure 6 depicts the shut-off controller 30 in an "on" position, whereas Figure 7 depicts the shut-off controller 30 in an "off" position. The motor 12 has a switch 90 adapted to engage a retainer clip 92, wherein the removal of the retainer clip 92 from the switch 90 causes the prompt shut-off of the motor 12. The shut-off controller and the switch 90 may be secured to any appropriate location such as the tiller arm or a side of the motor housing.

The shut-off controller 30 has a shut-off actuator 94, a lever 96, and a fulcrum 98. The lever 96 is movable between a first position C and a second position D. The lever 96 has a clip end 100, a actuator end 102, an inner side 104 and a point P on the inner side 104.

During normal operation of the motor 12 the lever 96 is in the first position C wherein it operatively connects the shut-off actuator94 and the switch 90. Activation of the shut-off actuator 94 causes the lever 96 to move to the second position D, causing the point P on the inner side 104 of the lever 96 to contact the fulcrum 98, causing the lever 96 to pivot about the point P. This

causes a pulling force to be applied to the retainer clip 92 by the clip end 100 of the lever 96. Upon the application of this pulling force, the retainer clip 92 disengages from the switch 90, as depicted in Figure 7. Preferably, the retainer clip 92 may be manually reset on the switch 90. The shut-off actuator 94 receives commands from the command receiver 22 by means of a receiver line 46. The shut-off actuator is preferably a solenoid adapted to apply pushing and/or pulling force appropriate to the lever and fulcrum arrangement employed. However, a DC motor or other device adapted to apply a pushing or pulling force may be employed.

The command transmitter 20 is adapted to send a signal to the command receiver 22, which is adapted to receive the signal and cause actuation of a corresponding controller. The signal is preferably a radio frequency ("rf") signal, but may be any other suitable signal, including an infra-red signal, an ultrasonic signal, voice command, or the like. The command transmitter preferably has an independent power source such as a battery pack releasably secured thereto and adapted to provide power to the command transmitter.

Figure 8 depicts a schematic wiring diagram for an embodiment of a portion of the command receiver 22 of the present invention. The command receiver 22 preferably comprises a receptor 110, servos 112 and switches 114. Power is supplied to the command receiver 22 by power lines 116 operatively connected to a battery 119. Preferably, power is supplied to the switches 114 and controllers via a second power line from a second battery 118. A battery charger 120 is preferably operatively connected to the second battery 118. The battery charger 120 may include a solar charger 121. Less preferably, a single battery may be employed to supply power to the command receiver 22, the switches 114 and the controllers.

It is preferable that the command receiver 22 has its own source of direct current power, in the form of a rechargeable battery. It is also desirable to provide means of charging the battery. This may be accomplished through the

use of one or more a solar panels affixed to the command receiver 22, and adapted to charge the batteries for the command receiver 22 in the presence of light. Additionally, or alternatively, it may be desirable to provide an auxiliary power line permitting the command receiver 22 to receive direct current power from the main battery of the boat.

The switches 114 are operatively connected to the controllers by receiver lines 46. For example, one switch 114 is connected to the shut-off controller 30, another switch 114 is connected to the steering controller 24, another switch 114 is connected to the throttle controller 26. Figure 8 depicts only the connection of a switch 114 to the throttle controller 26. Although a particular embodiment is depicted, it will be appreciated that the command receiver 22 may be assembled in a variety of suitable ways, will be apparent to those skilled in the art, in light of the disclosure contained herein.

Figure 9 depicts an embodiment of the exterior of a command transmitter 20. The command transmitter preferably has an antenna 122, a housing 124, power switches 126, transmitter switches 128, and a battery indicator 130, a hollow 108 and a water sensor 106.

Figure 10 is a schematic representation of an embodiment of a switch 114 having a central pair of poles (P and N) conductively connected to DC power. P is preferably connected to a wire having a positive charge, relative to the wire connected to N.

A second pair of poles (A, B) is conductively connected to the bi-directional mover responsible for controller movement. A first wire 135 is connected to pole A, and a second wire 136 is conductively connected to pole B. Taken together, the wires comprise the receiver line 46 which communicates with the mover. A connects to a first pole on the mover and B connects to a second pole on the mover.

A first jumper 132 conductively joins pole A and pole D. A second jumper 134 conductively connects pole B and pole C.

When the switch 114 is in a neutral position, no additional conductive connections are present.

When the switch 114 is closed in a first position, conductive connections are made between pole P and pole A and between pole N and pole B (not shown). This results in a positive charge on pole A and a negative charge on pole B. Thus, the mover receives a DC current of a first polarity.

When the switch 114 is closed in a second position, conductive connections are made between pole P and pole C, which is further conductively connected to pole B by the second jumper 134. Additionally, when the switch 114 is closed in the second position, conductive connections are made between pole N and pole D, which is further conductively connected to pole A by the first jumper 132 (not shown). Thus, when the switch 114 is closed in the second position, pole A has a negative charge and pole B has a positive charge. Thus, the mover receives a DC current of a second polarity.

The mover is adapted to move in a first direction when receiving DC current of the first polarity and to move in a second direction when receiving DC current of the second polarity.

In operation, a user depresses a transmitter switch 128 on the command transmitter 20 which causes a corresponding signal to be transmitted to the command receiver 22. The signal is received by the receptor 110 and is passed to the appropriate servo 112 which then activates the corresponding switch 114 which results in the completion of a circuit having the correct polarity for the function requested. The switch 114 communicates with the corresponding controller (for example, the throttle controller 26) via the receiver line 46, causing activation of the controller. While the invention is described with reference to the

use of a switch having two positions plus a neutral position which is mechanically actuated by a servo, numerous variants are contemplated and be apparent to one skilled in the art. In particular, it may be desirable to reduce the use of mechanical switches and servo and use appropriate integrated circuits mounted on a printed circuit board.

In a preferred embodiment, the command transmitter includes a water sensor 106 operatively coupled to the command transmitter 20 and adapted to cause the command transmitter 20 to send a signal causing actuation of the shut-off controller 30 upon the detection of water by the water sensor 106.

Alternatively, though less preferably, in another embodiment, the command transmitter 20 sends a signal to the command receiver 22 so long as the water sensor 106 does not detect water, which signal is terminated when the water sensor 106 detects water. Upon termination of the signal, the command receiver causes actuation of the shut-off control. This alternate embodiment places a greater demand on the batteries than the preferable embodiment where a signal is sent when water is detected.

The water sensor 106 is preferably located in a partially screened hollow 108 within the command transmitter 20 to reduce the likelihood of normal water spray or rain causing actuation of the shut-off controller 30, while permitting rapid entry of water and resultant actuation of the shut-off controller 30 upon immersion of the shut-off controller 30 in water. The water sensor means for actuating the shut-off controller 30 may co-exist with manual and water sensing means for actuating the shut-off controller 30 as well as other controllers. However, it is also contemplated to use the shut-off controller 30 with command transmitter 20 adapted to transmit a signal only to the command receiver for the shut-off controller 30, causing actuation of the shut-off controller 30 upon immersion of the command transmitter 20 in water. This has potential for use as a safety control for single-user motor boats, JET/SKI (trade-mark)-type devices, and the like.

In most cases, it will be preferable to use small bi-directional DC motors as movers for the controllers of the present invention. The movers used in the controllers of the present invention are preferably 12 volt direct current motors except for the shut-off controller which preferably employs a 6V mover such as a solenoid. Free-wheeling motors are desirable, so as to permit the easy manual manipulation of controls which are also subject to control by the controllers of the present invention. In particular, it is desirable that the actuators of the motors may be manipulated manually without the need to overcome significant mechanical resistance from the movers. However, other types of movers may be employed. For example, push-pull type solenoids may be suitable in some applications, as will be apparent to those skilled in the art, in light of the foregoing.

The switches 114 are preferably biased to a neutral position by the servos 112, such that when the command receiver 22 ceases communication with the controller, the servo 112 returns the switch 114 to a neutral position. The receiver lines 46 of the present invention are preferably secured to the command receiver 22 by way of screw-type connectors and are preferably fixedly secured to the controllers. This reduces the likelihood of the loss of a component which comes loose from the motor 12 during operation, as the component could remain secured to the apparatus 10 as a whole through the receiver lines 46.

Thus, it is apparent that there has been provided in accordance with the invention a REMOTE CONTROL SYSTEM FOR AN OUTBOARD MOTOR that fully satisfies the objects, aims and advantages set forth above. While the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as fall within the spirit and broad scope of the invention.

I CLAIM:

1. A remote control apparatus for the control of an outboard motor on a vessel, said remote control apparatus comprising:

a command transmitter,

at least one command receiver in wireless communication with said command transmitter,

a steering controller in operative communication with said command receiver,

a throttle controller in operative communication with said command receiver,

a gearing controller in operative communication with said command receiver, and

a shut-off controller in operative communication with said command receiver,

such that in operation a user can send a signal from said command transmitter which signal is received by said command receiver and conveyed to a corresponding controller, for action to carry out the command.

2. A remote throttle controller for an internal combustion motor on a vessel, said motor having a throttle actuator rotatable about a longitudinal axis, said throttle controller comprising:

means to receive operative communication from a remote transmitter for mover operation,

means to receive power for mover operation,

a bi-directional throttle actuator mover,

an operative linkage between said mover and the throttle actuator,

such that in operation, a movement of said throttle actuator mover causes said linkage to move, causing a corresponding rotation of the throttle actuator.

3. A first gearing controller adapted for use on an outboard motor wherein gearing control is actuated by rotation of the throttle handle, said first

gearing controller comprising:

a bi-directional actuator mover,

an operative linkage between said mover and the throttle actuator,

means to receive operative communication from a remote transmitter for mover operation,

means to receive power for mover operation,

such that in operation, a movement of said throttle actuator mover causes

said linkage to move, causing a corresponding rotation of the throttle actuator and the corresponding movement of the gears.

4. A steering controller adapted for use on an outboard motor on a vessel, wherein the motor is pivotable on a transom mounting bracket, said steering controller comprising:

a bi-directional steering mover,

an operative linkage between said mover and the bracket,

means to receive operative communication from a remote transmitter for mover operation,

means to receive power for mover operation,

such that in operation, movement of said steering mover causes said operative linkage to move, placing a pulling force on the motor and the bracket, thereby causing rotation of the motor with respect to the bracket.

5. The steering controller of claim 4 wherein the bracket includes a backing plate, and said operative linkage is between said mover and the backing plate.

6. A rotational gearing controller adapted for use on an outboard motor having a gearshaft adapted to actuate gear changes by rotation along a longitudinal axis, said gearing controller comprising:

a shaft engager adapted to releasably engage the gearshaft,

a bi-directional gearing mover,

an operative linkage between said mover and the shaft engager,

means to receive operative communication from a remote transmitter for mover operation,

means to receive power for mover operation,

such that in operation, activation of said mover causes rotation of said shaft engager which rotates the gearshaft.

7. A remotely controllable shut-off controller for an internal combustion motor, said motor having a releasable clip mediated shut-off mechanism in which disengagement of the clip from a switch during motor operation causes motor shut-off, said shut-off controller comprising:

a shut-off mover,

an operative linkage between said shut-off mover and the clip,

means to receive operative communication from a remote transmitter for mover operation,

means to receive power for mover operation,

such that during normal motor operation, the shut-off mover is in a first position permitting the clip to engage the switch, and

activation of said shut-off mover causes said mover to move to a second position, causing the clip to disengage from the switch.

8. A remote control apparatus comprising a command transmitter, a command receiver and the throttle controller of claim 3.

9. The remote control apparatus of claim 8 further including the steering controller of claim 4.

10. The remote control apparatus of either of claim 8 or claim 9 further including the shut-off controller of claim 7.

11. The remote control apparatus of claim 8 further including the first gearing controller of claim 3.

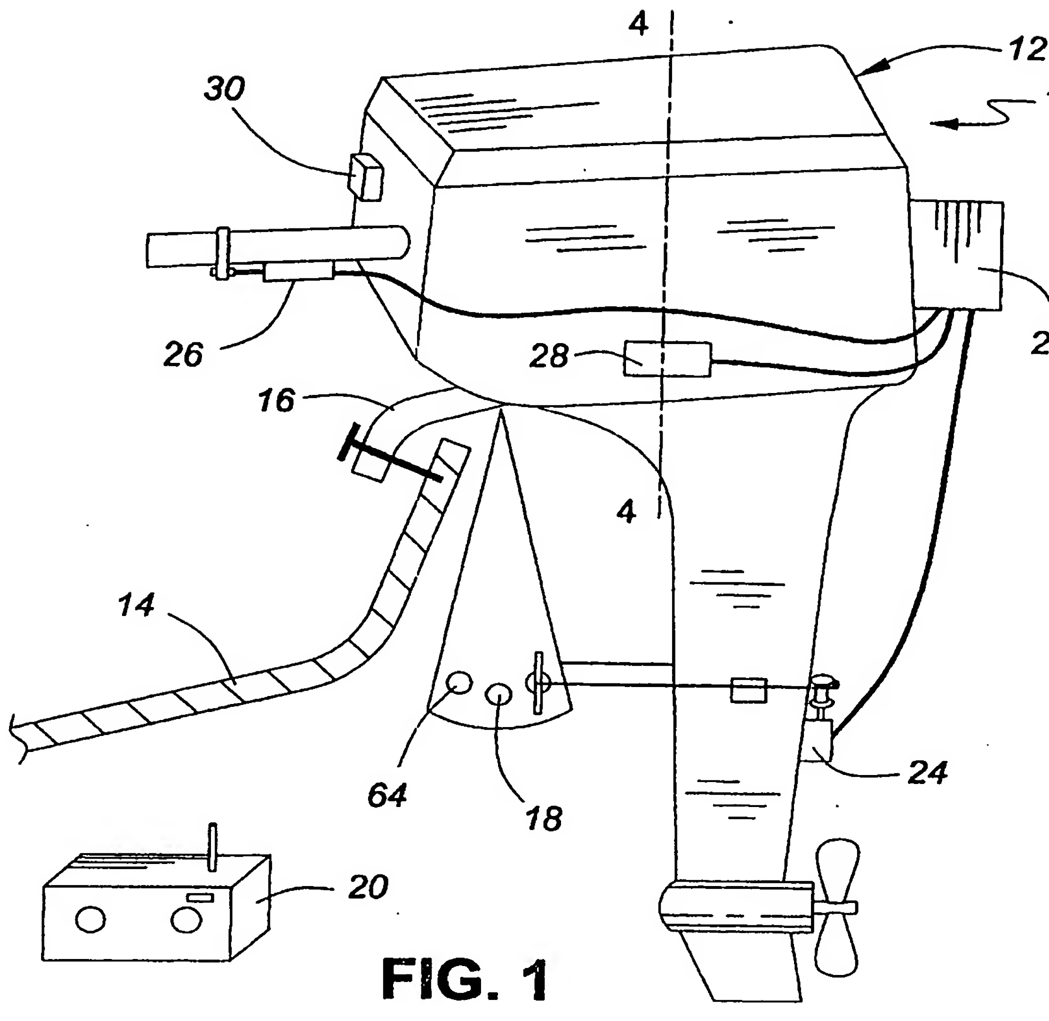

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FIG. 1

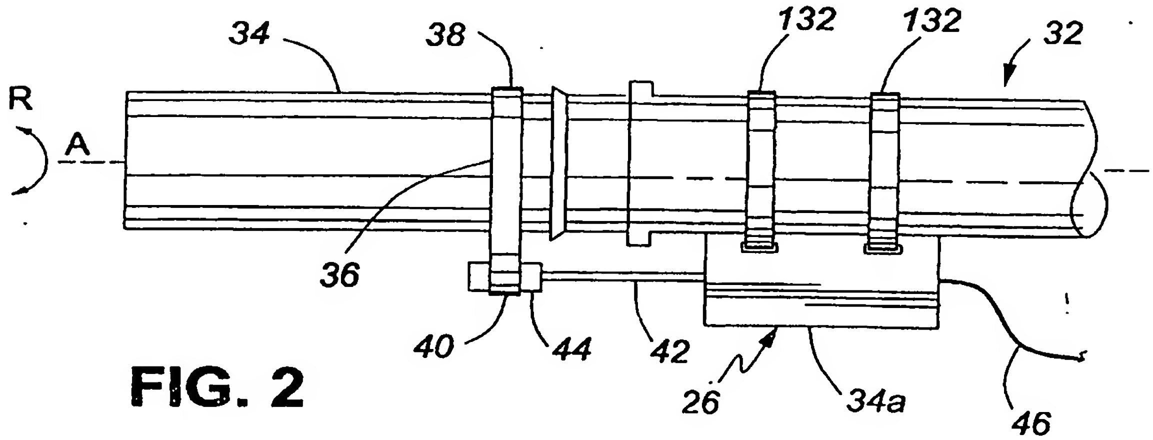

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FIG. 2

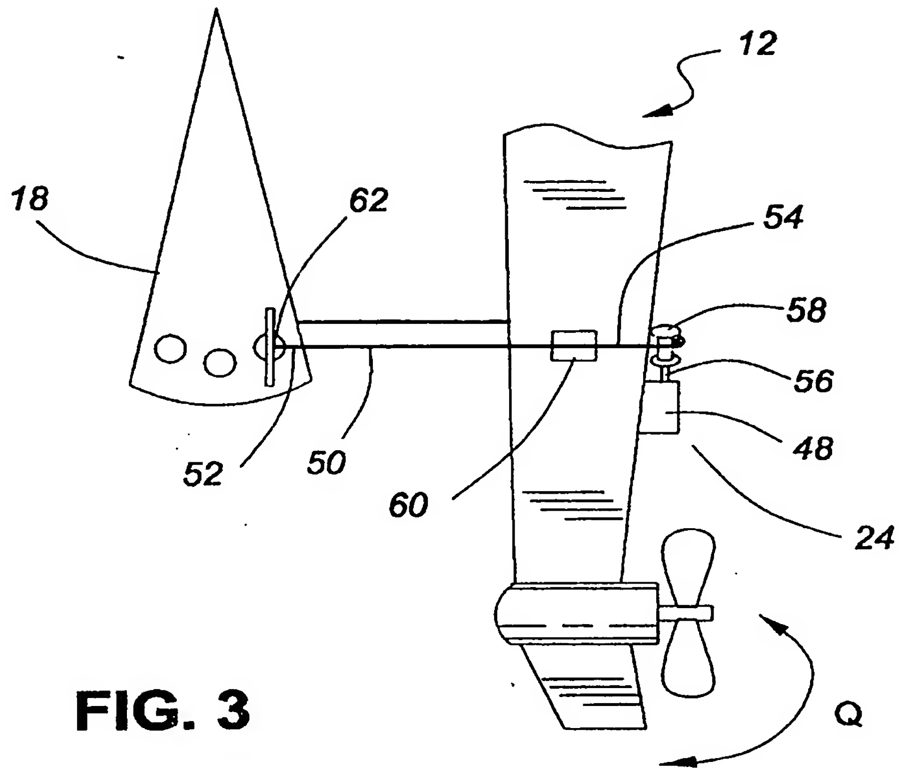



FIG. 3

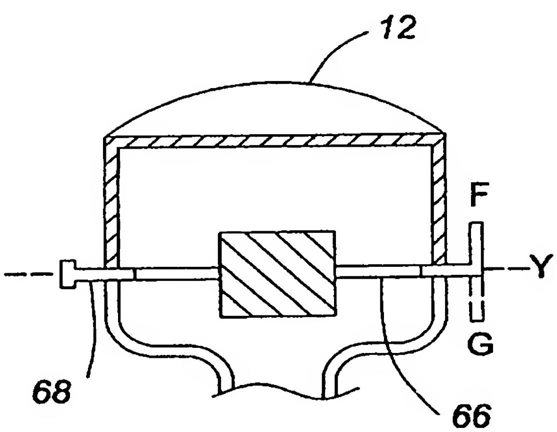



FIG. 4

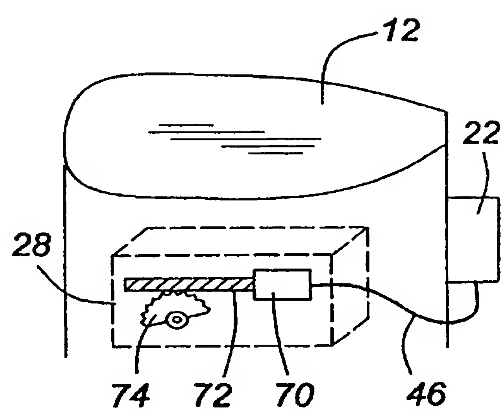



FIG. 5

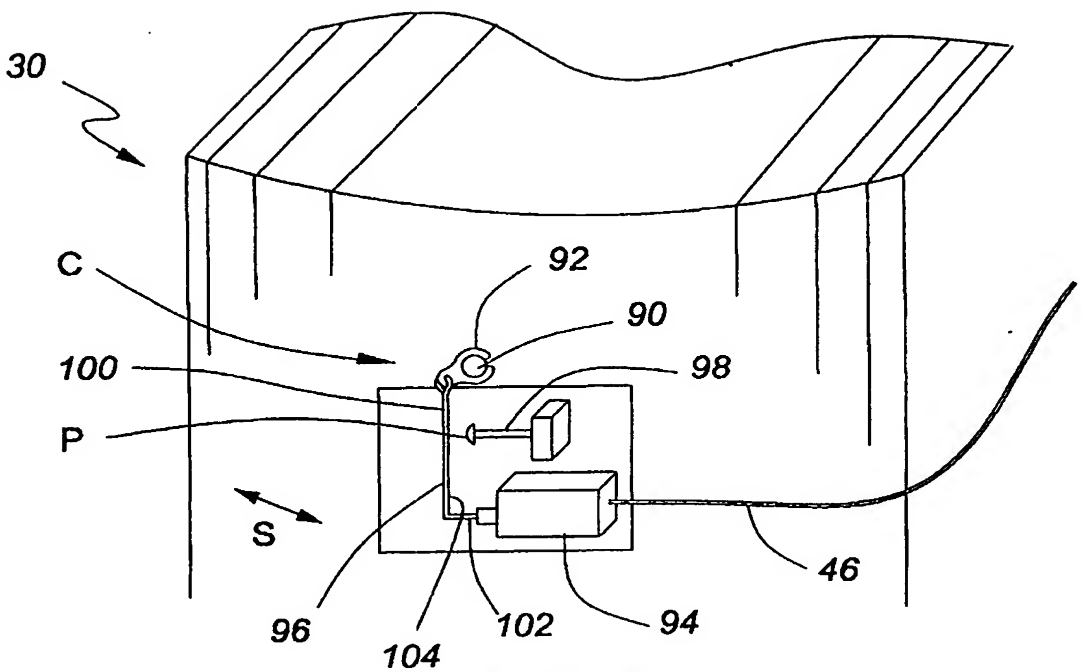



FIG. 6

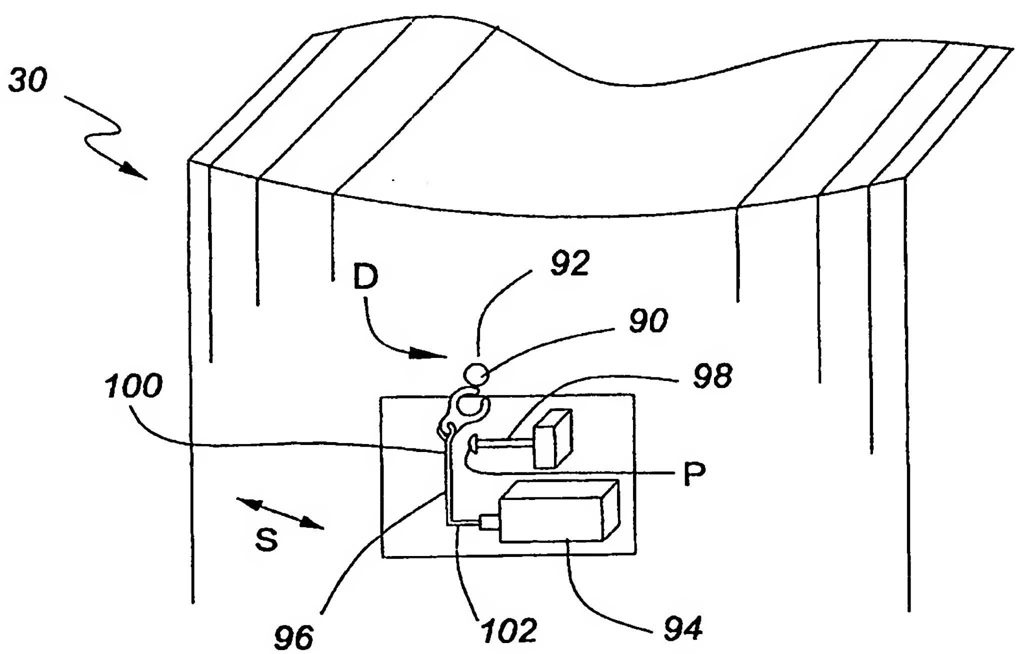



FIG. 7

12. A remote control apparatus comprising a command transmitter, a command receiver, the throttle controller of claim 3 and the rotational gearing controller of claim 6.

13. The remote control apparatus of claim 12 further including the steering controller of claim 4.

14. The remote control apparatus of either of claim 12 or claim 13 further including the shut-off controller of claim 7.

15. A command transmitter adapted for use with a remote control apparatus including a command receiver for the control of an outboard motor on a vessel, said command transmitter comprising:

a water sensor, and

signaling means,

such that, in operation, contact between said water sensor and water causes an operative signal to be transmitted by said signaling means to the command receiver.

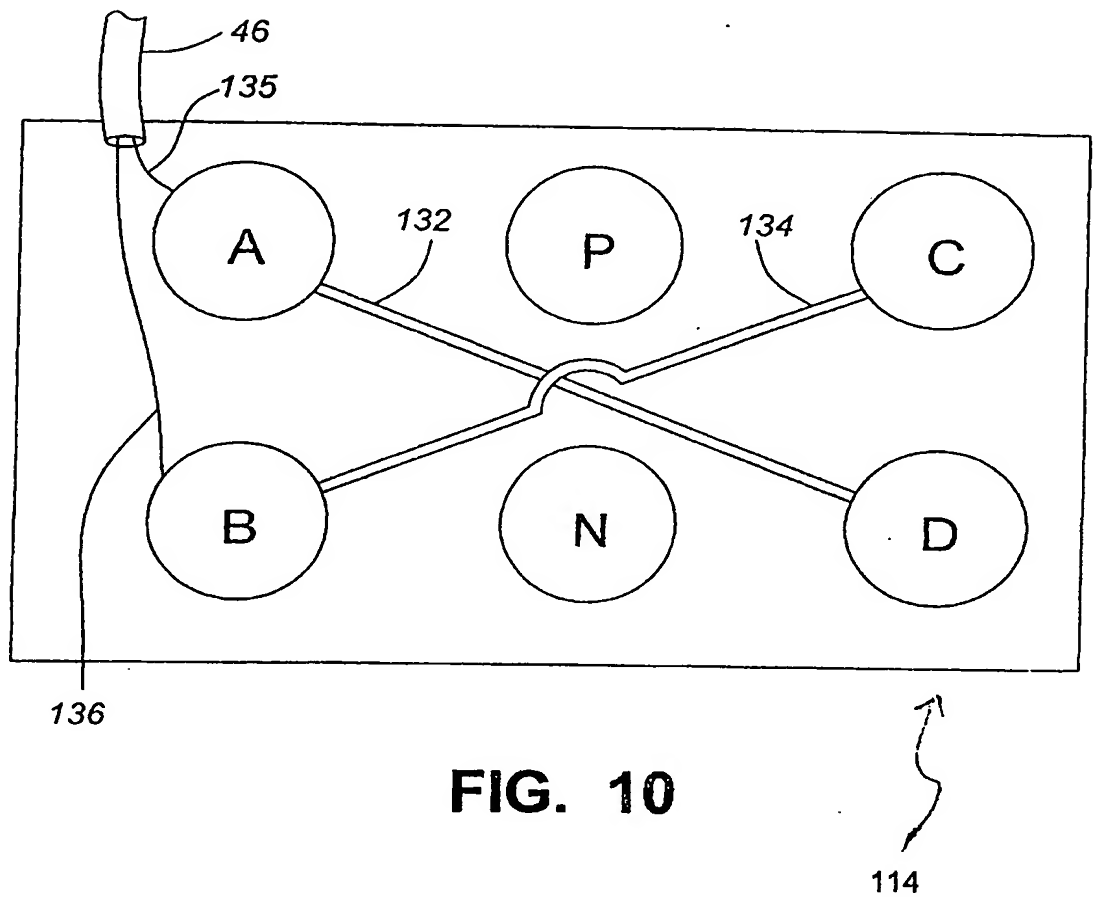
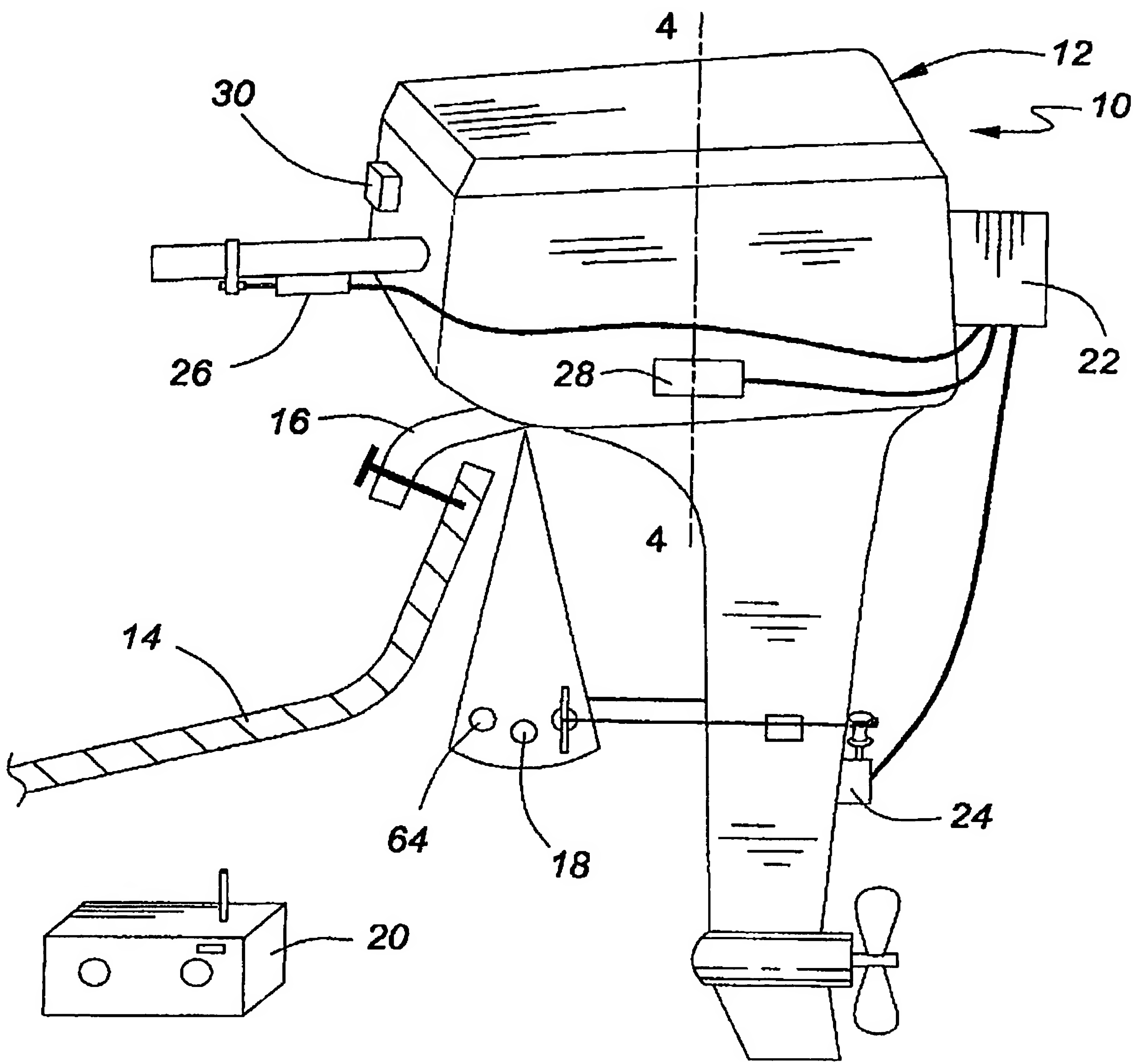



FIG. 10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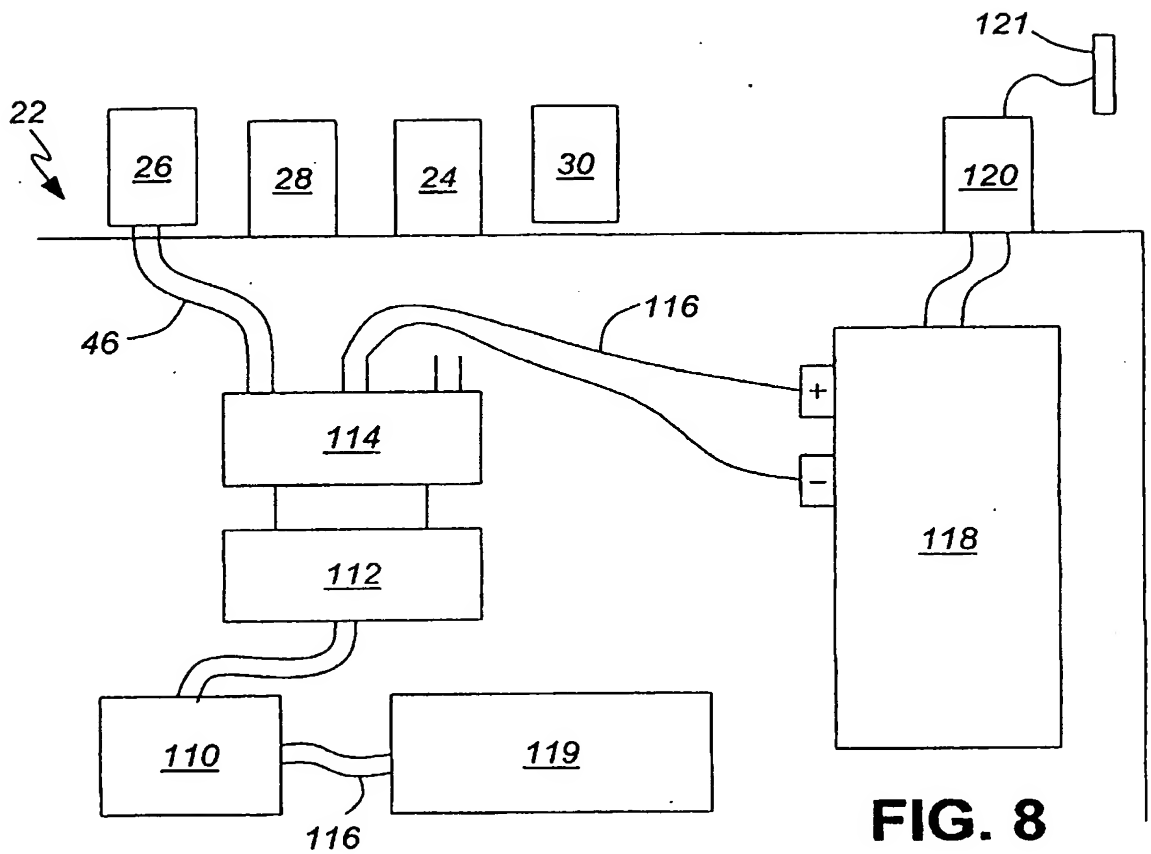
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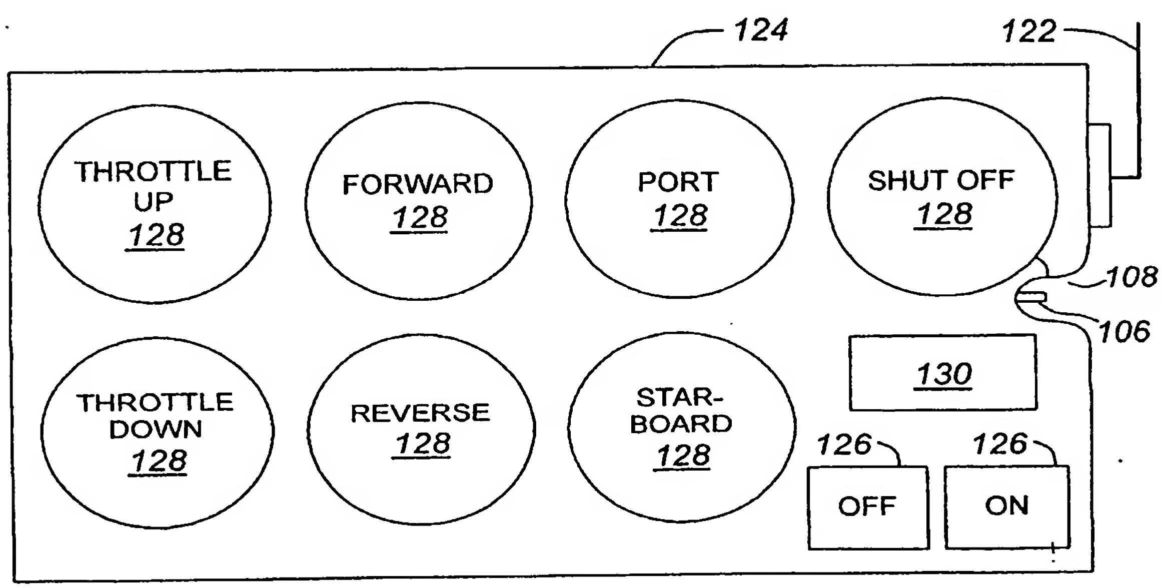
FIG. 8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122
THROTTLE UP 128
FORWARD 128
PORT 128
SHUT OFF 128
108
106
130
THROTTLE DOWN 128
REVERSE 128
STAR-BOARD 128
126
126
OFF
ON

FIG. 9